




APOLLO 40 YEARS



Celebrate Apollo

Exploring The Moon, Discovering Earth

A red-tinted photograph of the lunar surface. In the background, the Apollo 16 lunar module is visible on the horizon. The foreground is a dark, cratered lunar landscape. The sky is a uniform red color.

“...We go into space because whatever mankind must undertake, free men must fully share. ... I believe that this nation should commit itself to achieving the goal before this decade is out, of landing a man on the moon and returning him safely to Earth. No single space project in this period will be more exciting, or more impressive to mankind, or more important for the long-range exploration of space; and none will be so difficult or expensive to accomplish ...”

President John F. Kennedy

May 25, 1961



Celebrate Apollo

Exploring The Moon, Discovering Earth

Less than five months into his new administration, on May 25, 1961, President John F. Kennedy, announced the dramatic and ambitious goal of sending an American safely to the moon before the end of the decade. Coming just three weeks after Mercury astronaut Alan Shepard became the first American in space, Kennedy's bold challenge that historic spring day set the nation on a journey unparalleled in human history.

Just eight years later, on July 20, 1969, Apollo 11 commander Neil Armstrong stepped out of the lunar module, taking "one small step" in the Sea of Tranquility, thus achieving "one giant leap for mankind," and demonstrating to the world that the collective will of the nation was strong enough to overcome any obstacle. It was an achievement that would be repeated five other times between 1969 and 1972.

By the time the Apollo 17 mission ended, 12 astronauts had explored the surface of the moon, and the collective contributions of hundreds of thousands of engineers, scientists, astronauts and employees of NASA served to inspire our nation and the world. Apollo remains the quintessential reminder of what humans can accomplish.

As we continue our quest of exploration and discovery, it may be best to remember the words a gallant, young president spoke at Rice University in 1962. Quoting William Bradford, who was speaking in 1630 of the founding of the Plymouth Bay Colony, Kennedy said, "... all great and honorable actions are accompanied with great difficulties, and both must be enterprised and overcome with answerable courage."

Such sentiments defined the Apollo missions. The situation is much the same today as we face new challenges in our quest to pioneer new frontiers. As we deal with the crises facing the nation and the world, perhaps it would be wise to look to what was achieved in the past and throw our national will into finding new solutions to the problems that imperil the Earth itself, an Earth that we first really saw in a photo taken by an Apollo astronaut as he was leaving our celestial home. To do so can only serve to help humankind define our direction and ultimately our will for space explorations as the 21st century advances.

On April 27, 2009, President Barack Obama told the National Academy of Sciences in Washington, D.C.: "On the 40th anniversary of the Apollo program, we celebrate many great achievements in the history of mankind, the people that made it happen, and a better understanding of the place we call home."





1967

APOLLO 1

Virgil I. “Gus” Grissom; Edward H. White, II; and Roger B. Chaffee

The first tragic setback in the history of space flight occurred Jan. 27, 1967, when the crew of Gus Grissom, Ed White and Roger Chaffee were killed in a fire in the Apollo command module during a preflight test at Cape Canaveral. They were training for the first crewed Apollo flight, an Earth-orbiting mission scheduled to be launched Feb. 21.

The crew was taking part in a “plugs-out” test, in which the command module was mounted on the Saturn 1B on the launchpad, just as it would be for the actual launch. The plan was to go through an entire countdown sequence.

At 1 p.m. EDT, the astronauts entered the capsule on Pad 34 to begin the test. A number of minor problems cropped up, which delayed the test considerably, and finally, a failure in communications forced a hold in the count at 5:40 p.m. At 6:31, White was heard to say, “Fire in the cockpit.” The fire spread throughout the cabin in a matter of seconds. The last crew communication ended 17 seconds after the start of the fire, followed by loss of all telemetry.

Because the cabin had been filled with a pure oxygen atmosphere at normal pressure for the test and there had been many hours for the oxygen to permeate all the material in the cabin, the fire spread rapidly, and the astronauts had no chance to get the hatch open. Nearby, technicians tried to get to the hatch but were repeatedly driven back by the heat and smoke. By the time they succeeded in getting the hatch open, roughly five minutes after the fire started, the astronauts had already perished.

The Apollo program was put on hold while an exhaustive investigation was made of the accident. It was concluded that the most likely cause was a spark from a short circuit in a bundle of wires that ran to the left and just in front of Grissom’s seat. The large amount of flammable material in the cabin in the oxygen environment allowed the fire to start and spread quickly. A number of changes were instigated in the program over the next year and a half, including designing a new hatch that opened outward and could be operated quickly, removing much of the flammable material and replacing it with self-extinguishing components, using a nitrogen-oxygen mixture at launch, and recording all changes and overseeing all modifications to the spacecraft design more rigorously.

The mission, originally designated Apollo 204 but commonly referred to as Apollo 1, was officially assigned the name “Apollo 1” in honor of Grissom, White and Chaffee.





1968

APOLLO 7

Donn F. Eisele, Walter M. Schirra and R. Walter Cunningham

Just 21 months after the Apollo 1 tragedy, Apollo 7 lifted off for its shakedown flight from the Kennedy Space Center. Launch occurred Oct. 11, 1968. This was the first human flight of the new Apollo spacecraft. The main objectives of the mission were to test the many systems of the vehicle's command and service modules, including test-firing the engines that would place the astronauts in lunar orbit.

Because the mission was not carrying a lunar module, Apollo 7 employed a Saturn 1B booster instead of the larger Saturn V rocket used for every other moon-related Apollo launch. In addition to being the first flight of the Apollo spacecraft, the mission was the first flight of the new Apollo spacesuits and featured the first live television broadcast from orbit.

Commander Wally Schirra had announced his retirement from NASA before the flight. He was 45 years old and became the oldest astronaut to fly in space. He was the first to fly on Mercury, Gemini and Apollo. The 11-day mission took its toll on Schirra and crewmates Donn Eisele and Walter Cunningham. All developed colds and often challenged mission control over the flight's ambitious work schedule. However, the crew and spacecraft performed well, and the Earth-orbital flight proved the space-worthiness of the new Apollo vehicle.





1968

APOLLO 8

James A. Lovell, Jr., William A. Anders and Frank F. Borman, II

The Apollo 8 mission was supposed to be the first checkout flight for the new lunar lander, but technical delays and rumors of a Soviet Union moon mission pushed NASA to make a bold decision. Frank Borman, Jim Lovell and William Anders would become the first humans to venture beyond Earth orbit and visit another world.

The first launch of the giant Saturn V booster with people atop it came Dec. 21, 1968, from the Kennedy Space Center. The crew departed Earth at 10:17 a.m., when mission control gave the astronauts a “go” for the firing of the third stage rocket that propelled them to the moon.

The journey took three days. Apollo 8’s crew entered lunar orbit on Christmas Eve and became the first humans to see the moon’s far side. For the next 20 hours, the crew studied a landscape that appeared to be a lifeless wasteland made up of gray sand and craters. They scouted future landing sites, took photographs and used their cameras to capture the first Earthrise, as seen from the moon. During the first live television broadcast from the moon, the astronauts read passages from the Book of Genesis.

On Christmas Day 1968, during the 10th orbit around the moon, the crew fired the spacecraft’s main engine to return to Earth. The mission’s success gave the entire Apollo program an important boost and secured a lead in the 1960s space race that America would not relinquish.





1969

APOLLO 9

James A. McDivitt, David R. Scott and Russell L. Schweickart

Apollo 9 was the first space test for the final piece of the Apollo moon-landing hardware – the lunar module. It was the first vehicle designed to operate only in the vacuum of space. The lunar module was relatively light and had no heat shield, unlike all previous human spacecraft.

For the first time since Gemini 3 in 1965, the crew was allowed to give the spacecraft names. Astronauts James McDivitt, Dave Scott and Rusty Schweickart labeled their leggy lunar module “Spider” and dubbed the Apollo command module “Gumdrop.”

The crew launched into Earth orbit March 3, 1969. The mission was designed to put both spacecraft through their paces, flying together as one unit, then separately to test rendezvous and docking capabilities. This flight also was the first to test in the vacuum of space the backpacks that would serve as portable life-support systems for astronauts on the lunar surface.

During the course of the 10-day mission, the astronauts docked and undocked their spacecraft and test fired their engines to simulate the journey to the moon’s surface. McDivitt and Schweickart flew the Apollo lunar module, while Scott remained inside the command module.

During a pivotal spacewalk, Schweickart successfully climbed out on the lunar module’s front platform as Scott observed from the open hatch of the nearby command module. The exercise tested equipment that would be used to walk on the moon.

After 151 Earth orbits, the Apollo 9 crew splashed down safely in the Atlantic Ocean. The successful mission set the stage for a final dress rehearsal before NASA would attempt a landing on the moon.





1969

APOLLO 10

Eugene A. Cernan, John W. Young and Thomas P. Stafford

Although the mission publicly was labeled only a dress rehearsal, the flight of Apollo 10 was the second time astronauts orbited the moon and the first flight test of the lunar module above the surface. It was a challenging mission that fully tested all of Apollo's components.

Apollo 10 roared into space May 18, 1969. It was the fourth crewed Apollo flight in seven months. Because the mission required the lunar module to skim the moon's surface and "snoop around," astronauts Gene Cernan, John Young and Thomas Stafford named the vehicle "Snoopy." Appropriately, the Apollo command module was labeled "Charlie Brown."

On May 21, 1969, both spacecraft entered lunar orbit. Astronauts Cernan and Stafford undocked Snoopy and began their lunar approach, leaving Young aboard Charlie Brown. An hour later, the lunar module descended to within 10 miles of the moon's surface. There were some tense moments during the decent, when a faulty switch setting caused the lunar module to gyrate wildly. Stafford and Cernan regained control just seconds before disaster. They finished their survey of the Apollo 11 landing site at the moon's Sea of Tranquility and safely returned to the command module.

The crew arrived back on Earth on May 26, 1969, after 31 orbits of the moon. Among its firsts, Apollo 10 broadcast more than five hours of live color television programming from space.





1969

APOLLO 11

Neil Armstrong, Michael Collins and Edwin E. Aldrin, Jr.

“Men have landed and walked on the moon.” That was how the New York Times recorded the events of July 20, 1969, when NASA met President Kennedy’s challenge and pulled off one of the greatest achievements in human history. On that day, American astronauts set foot on another celestial body.

The straightforward but monumental goal of Apollo 11 was to “perform a manned lunar landing and return.” The mission began the morning of July 16, 1969, with astronauts Neil Armstrong, Buzz Aldrin and Michael Collins seated in the command module Columbia atop a Saturn V rocket at the Kennedy Space Center. At 9:32 a.m. EDT, the three-stage, 36-story rocket used its 7.5 million pounds of thrust to propel the crew into space – and history.

Three days later, Armstrong and Aldrin climbed into the lunar module to attempt the first-ever landing on the moon’s surface. Their spacecraft was named Eagle, in honor of the winged symbol of America, which also was the inspiration for the flight’s mission insignia. Collins, who stayed behind aboard Columbia, later would write that the lunar module was “the weirdest looking contraption I have ever seen in the sky.”

During the final seconds of Eagle’s decent, with computer alarms sounding and fuel running dangerously low, Armstrong manually took control of the ship and steered clear of boulders that littered the landing site. At 4:18 p.m. July 20, 1969, Armstrong finally radioed back to an anxious Earth, “Houston, Tranquility Base here. The Eagle has landed.”

Six hours later, at 9:56 p.m., Armstrong took his “one giant leap for mankind.” Aldrin joined him on the moon about 15 minutes later, and the astronauts spent two and a half hours collecting soil samples and rocks, setting up experiments and photographing the surface from a vantage point considered impossible less than a decade earlier. The crew completed a triumphant return to Earth four days later with a splashdown in the Pacific Ocean.





1969

APOLLO 12

Charles Conrad, Jr.; Richard F. Gordon, Jr.; and Alan L. Bean

In April 1967, the unpiloted robotic probe Surveyor 3 landed on the moon's Ocean of Storms. Two years later, Apollo 12 attempted a pinpoint landing nearby so moonwalkers Charles "Pete" Conrad and Alan Bean could retrieve pieces of Surveyor 3 and return them to Earth for analysis.

The mission got off to a bumpy start shortly after liftoff Nov. 14, 1969, when lightning struck the crew's Saturn V rocket. For a few moments, it appeared that the flight might be in jeopardy. However, quick thinking by mission control and Bean inside the command module Yankee Clipper restored the flow of data between the spacecraft and the ground; NASA was headed to the moon for a second landing attempt.

Because of the rocky lunar terrain at the Sea of Tranquility, Apollo 11 had missed its targeted landing site by about four miles. For Apollo 12 to be successful, Conrad and Bean had to land the lunar module Intrepid within walking distance of the Surveyor lander. With command module pilot Dick Gordon orbiting overhead, Conrad and Bean touched down within 600 feet of the probe.

Conrad took his first steps on the moon at 6:44 a.m. Nov. 19, 1969. After having a little trouble making the last step from Intrepid's ladder, he exclaimed, "Whoopee! Man, that may have been a small step for Neil, but that's a long one for me." Bean joined him minutes later. The two astronauts made two moon walks and spent more than 31 hours on the lunar surface. They retrieved several pieces of Surveyor 3, including the spacecraft's camera.

For the first time, color television pictures were beamed live from the lunar surface. However, as Bean moved the camera to a new location, he accidentally pointed it directly at the sun, destroying the picture tube and ending television coverage. The astronauts would rely on the images they captured with their still cameras to document the mission. The crew completed a safe return to Earth on Nov. 24, 1969, with a splashdown in the Pacific Ocean.





1970

APOLLO 13

James A. Lovell, Jr.; John L. Swigert, Jr.; and Fred W. Haise, Jr.

Historians have concluded that some of Apollo's finest moments came during the one flight that failed to achieve its goal. Astronauts Jim Lovell, Fred Haise and Ken Mattingly were assigned to the Apollo 13 mission, which was supposed to land in the moon's Fra Mauro region. However, the first of several bad breaks came 72 hours before the scheduled launch, when Mattingly, the command module pilot, was removed from the mission after being exposed to German measles. Backup astronaut Jack Swigert took Mattingly's place.

Apollo 13 was launched from the Kennedy Space Center on April 11, 1970. Two days later, about 200,000 miles from Earth, the Apollo 13 crew completed a television broadcast from the command module Odyssey and the lunar module Aquarius. The major television networks declined to carry the transmission live because network executives thought the flights had become routine. That belief was shattered moments later, when an oxygen tank in the spacecraft's service module exploded. Swigert was the first to call mission control with the often-paraphrased report "Houston, we've had a problem here."

America's third moon landing was aborted. The new plan was simply to get the astronauts home alive. The drama unfolding in space quickly captivated the world.

With Odyssey running out of oxygen and power, the crew powered up Aquarius to serve as a lifeboat. The lunar module was designed to support two men for two days. Now, it was being asked to care for three astronauts for almost four days. Carbon dioxide rose to dangerous levels, and mission managers ingeniously devised a way to attach the command module's air filters to the lunar module's system using plastic bags, cardboard, tape and an old sock.

The ride back to Earth was cold and miserable. The crew had little food and water, and even less sleep. But the Apollo 13 mission ended safely with a splashdown in the Pacific Ocean on April 17, 1970. NASA had pulled off a feat almost as impressive as a successful moon landing.





1971

APOLLO 14

Stuart A. Roosa; Alan B. Shepard, Jr.; and Edgar D. Mitchell

Apollo 14 picked up the mission that was abandoned by the troubled Apollo 13 flight. The astronauts' destination was the moon's hilly region north of the Fra Mauro crater.

Commanding the mission was Alan Shepard, the first American in space and the only original Mercury astronaut to make it to the lunar surface. He had been grounded for almost five years because of an inner ear condition that caused dizziness and disorientation. Corrective surgery allowed Shepard to return to flight status in 1969. At age 47, he was the oldest astronaut in the program. His Apollo 14 crewmates were Stuart Roosa, the command module pilot, and Edgar Mitchell, the lunar module pilot. The mission lifted off from the Kennedy Space Center on Jan. 31, 1971.

The journey to the moon had its share of minor problems. Roosa had difficulty docking the command module, Kitty Hawk, to the lunar module, Antares. It took five attempts and more than 90 minutes to connect the two spacecraft. After the two ships undocked in lunar orbit, computer and radar glitches aboard Antares initially threatened the descent to the surface. However, the problems were resolved, and Shepard and Mitchell safely landed their spacecraft on the moon Feb. 5, 1971.

The two astronauts made two moonwalks while Roosa collected data and took photographs from Kitty Hawk, which was orbiting overhead. Shepard and Mitchell deployed and activated various scientific equipment and experiments, and collected almost 100 pounds of lunar soil and rock samples. Their work on the moon was made easier by a two-wheeled cart called the Modular Equipment Transporter.

Despite Apollo 14's many technical and scientific achievements, the mission is remembered by many for Shepard's golf prowess. An avid golfer, the veteran astronaut combined the head of a 6-iron and a collapsible tool handle to create a golf club. He took a couple of shots as his final moonwalk was coming to an end.

The Apollo 14 mission concluded Feb. 9, 1971, with the crew's successful splashdown in the Pacific Ocean.





1971

APOLLO 15

James B. Irwin, David R. Scott and Alfred M. Worden

Beginning with Apollo 15, NASA committed to more advanced lunar exploration. The program's final three missions conducted more detailed scientific studies of the moon on the surface and from lunar orbit.

Astronauts Dave Scott, Jim Irwin and Al Worden named their command module Endeavour in honor of the 18th century sailing ship that Capt. James Cook used for the first extensive science voyages. Cook likely would have envied the Apollo 15 expedition, which was designed to conduct lunar exploration over longer periods, greater distances and with more science instruments than any other Apollo mission had.

Apollo 15 launched from the Kennedy Space Center on July 26, 1971. Astronauts Scott and Irwin guided their lunar module to a safe touchdown on the moon four days later. Named Falcon, this modified lunar module was able to carry a heavier payload, including the first Lunar Roving Vehicle. The vehicle was a battery-operated moon buggy designed to transport Scott and Irwin long distances along Hadley Rille, a narrow valley near the Apennine Mountains.

During their three lunar excursions, Scott and Irwin rode 17 miles in the Lunar Roving Vehicle, giving them the freedom to conduct more extensive geological surveys. One of the most important samples collected during the mission was the Genesis Rock, believed to be a piece of lunar crust from about the time of the moon's origin.

The astronauts stayed on the lunar surface for almost 67 hours. Worden, who piloted Endeavour in lunar orbit while Scott and Irwin were on the moon, conducted the first Apollo spacewalk on the way back to Earth to retrieve film from the side of the Endeavour's service module. The crew landed in the Pacific Ocean on Aug. 7, 1971, to successfully complete the mission.





1972

APOLLO 16

Thomas K. Mattingly, II; John W. Young; and Charles M. Duke, Jr.

Apollo 16 was the fifth mission to successfully land astronauts on the moon and the second to conduct a longer, more science-oriented lunar expedition.

The crew's powerful Saturn V rocket was launched from the Kennedy Space Center on April 16, 1972. Commander John Young, making his second trip to the moon, was joined by astronauts Charlie Duke and Ken "T.K." Mattingly, who was pulled from his Apollo 13 assignment after being exposed to the measles. The crew named their command module Casper after the ghostly appearance of the astronauts' white spacesuits. The lunar module was dubbed Orion. For the second time, the lunar module carried a rover to the moon's surface.

A problem occurred after Casper undocked from Orion in lunar orbit. As the lunar module was descending to the moon's Descartes Highlands, Mattingly reported a malfunction in the system that controlled the steering of Orion's main engine.

Young and Duke had another problem aboard Casper. The lunar module had a glitch that pressurized the propellant tanks to dangerously high levels. The crew relieved the pressure by firing the thrusters, but the tactic cost them precious fuel. The two spacecraft flew in formation above the moon as NASA managers in mission control debated whether to scrub the lunar landing.

The decision eventually was made to proceed, and on April 21, 1972, Orion landed safely and on target. Of the six Apollo landings, this was the only one to explore the lunar highlands.

Young and Duke spent more than 20 hours walking and driving on the moon during three moonwalks. Among the records set during this mission was a lunar land speed record of more than 11 mph in the moon buggy. The crew safely landed in the Pacific Ocean on April 27, 1972, to conclude the flight.





1972

APOLLO 17

Harrison H. Schmitt, Eugene A. Cernan and Ronald E. Evans

Apollo 17 would be the program's final journey to the moon. The mission was a spectacular conclusion to the first era of human space exploration. One of the last two men to walk on the moon was a first for NASA – a true scientist, geologist Jack Schmitt.

Apollo 17 was the only night launch of the program, lifting off at 12:33 a.m. Dec. 7, 1972. The mission's destination, the Taurus-Littrow region near the rim of the Serenitatis Basin, was a geologist's dream. It had steep-walled valleys with large boulders at their base. The area gave NASA an opportunity to sample both young volcanic rock and older mountainous wall material at the same location.

Joining Schmitt on the lunar surface was veteran Apollo astronaut Gene Cernan. It was his second trip to the moon. During Apollo 10, Cernan flew the lunar module to within 50,000 feet of the surface. This time, on Dec. 11, 1972, Cernan took his second moon lander, named Challenger, all the way down. In lunar orbit above Cernan and Schmitt was astronaut Ron Evans, pilot of the command module America.

Like the two preceding Apollo missions, there were three moonwalks. The astronauts used the lunar rover to travel almost 19 miles, collecting 243 pounds of rock and soil. Apollo 17 suffered the first extraterrestrial fender bender when Cernan accidentally ripped one of the rover's bumpers with a hammer. He used a plastic map to make repairs. Cernan and Schmitt spent 22 hours walking and driving on the moon during almost 75 hours on lunar surface.

Challenger lifted off from the moon's surface Dec. 14, 1972. On the lunar lander's decent stage, the astronauts left behind a plaque that reads, "Here Man completed his first exploration of the Moon, December 1972 A.D. May the spirit of peace in which we came be reflected in the lives of all mankind."

The Apollo program's lunar missions ended Dec. 19, 1972, when the crew splashed down safely in the Pacific Ocean.



“That’s one small step for man,
one giant leap for mankind.”

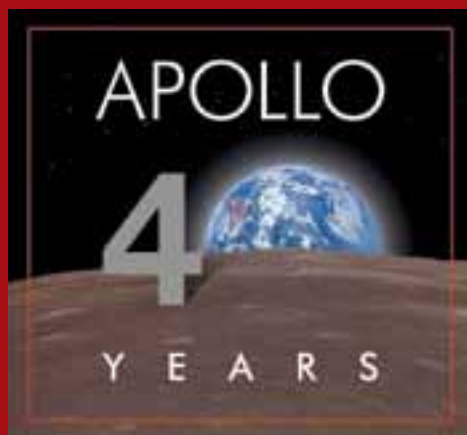
Neil Armstrong

At 10:56 p.m. EDT July 20, 1969



“It is difficult to say what is impossible, for the dream of yesterday is the hope of today and reality of tomorrow.”

Robert Goddard



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